Protocol Development Summary

Wetlands (Updated 4/28/10)

Parks where protocol will be implemented: PINN (a separate protocol will be developed for GOGA (including MUWO) and PORE).

Justification/Issues being addressed:
Wetlands are keystone ecosystems in the San Francisco Bay Area. Some ecologists call wetlands "the kidneys of the landscape" as they provide water quality protection, flood and drought mitigation, erosion control, and groundwater recharge functions. Wetlands have also been called "biological supermarkets," for supporting complex food webs, housing a rich biodiversity of wetland-endemic species, and providing habitat functions for many aquatic and terrestrial species. An estimated 46% of US endangered and threatened species and 50% of all bird species require wetland habitat (USFWS). Wetland habitats are vulnerable to alteration due to global climate change and associated potential temperature, hydrology, and salinity regime changes. Understanding the condition of wetlands in SFAN parks may be a good proxy for understanding the condition of many taxa of concern in the network.

The San Francisco Bay Area Network includes estuarine, palustrine, lacustrine, and riverine wetlands. The two coastal parks in the network, PORE and GOGA contain a combined 120 miles of coastline, with numerous small estuarine wetlands at the convergence of freshwater streams and the Pacific. In addition, these parks contain and border on some of the most pristine (Drakes Estero) and largest (San Francisco Bay) estuaries on the west coast of North America. Palustrine wetlands are found within PORE, GOGA, PINN, PRES, and MUWO. These host rare and protected plants, and provide critical habitat for migratory birds. Natural lacustrine wetlands within the network are limited to several small ponds and lakes within GOGA and PORE, while riverine wetlands are found in all SFAN parks covered by this protocol.

Parks within the SFAN have made a concentrated effort to map and characterize wetlands on park lands using the Cowardin et al. (1979) classification. All of these mapped wetlands are classified by wetland type and plant community. Many of the mapped wetland polygons have also been characterized by complexity of biotic structure, dominant hydrology, function (e.g., flood retention, wildlife habitat), and major stressor (e.g. ,grazing, adjacent development, invasive species).

Monitoring questions to be addressed by the protocol:

1. How is the extent, type, condition, and function of wetlands changing over time in response to anthropogenic stressors and climactic variability.
2. Example questions include:
   - Is the hydrology of these wetlands changing over time in response to grazing, development, climate change?
   - Is the type of wetland changing over time, e.g. are emergent vegetation communities shifting to scrub-shrub communities?
   - Is native plant/animal use of SFAN wetlands changing over time?

- Are invasive plant populations in SFAN wetlands increasing or decreasing?

The monitoring objectives are:

1. Determine trends in the abundance of wetlands associated with stream channels at Pinnacles National Monument.

2. Determine trends in vegetation communities (foliar cover for several general guilds, foliar cover of specific tree and shrub species, guild richness) of riparian areas at Pinnacles NM.

3. Determine trends in stream channel width and substrate size at Pinnacles NM.

Basic approach:
The wetlands monitoring program will be built upon wetland inventories that have already been completed in SFAN parks. These inventories resulted in a map of wetland polygons. A set of polygons from this map will be selected for cyclic monitoring on a "fixed site + rotating panel" design. The network acknowledges selecting polygons only from the existing wetlands maps will result in a non-random selection of wetland polygons within the network, as wetland mapping efforts have been unevenly distributed throughout SFAN lands.

Mapped wetland polygons will be stratified first by type, then by predominant stressor type (e.g., grazing, adjacent development, invasive species, no evident threat). Wetland polygons will be sampled from the resulting data set so that each major type is well represented. Samples will not be random, but may be chosen for accessibility and representativeness. Because wetlands in Wilderness portions of SFAN parks are not expected to change as rapidly as wetlands on non-Wilderness lands, cyclic monitoring will more heavily focus on wetlands that are subjected to known stressors.

These selected wetlands will be sampled quantitatively for integrity indicators such as water quality, water quantity, channel sinuosity and entrenchment, exotic plant cover, plant diversity, and percentage of obligate wetland plants.

Principal investigator and NPS lead:
Protocol development will be coordinated by the NPS Pacific West Region Aquatic Ecologist, Marie Denn (415.464.5222).

Proposed Development schedule, budget, and expected interim products:
A protocol will be developed for Pinnacles National Monument. Once approved, it will be implemented. Work will begin on a protocol for GOGA and PORE upon completion of the PINN protocol. Annual budget approximately 30K.

Literature Cited
Cowardin, L.M. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. DOI, Fish and Wildlife Service, Office of Biological Sciences, Washington D.C.